WHAT IS CLAIMED IS:

1. A method for manufacturing a semiconductor device, comprising the steps of:

forming, in a semiconductor layer formed on a first insulating film, an element isolation groove extending to the first insulating film; and

depositing a second insulating film in the element isolation groove by using a vapor deposition method.

2. The method according to claim 1, wherein the step of depositing the second insulating film is conducted so as to partially fill the element isolation groove, the method further comprising, after the step of depositing the second insulating film, the step of forming an embedded layer so as to completely fill the element isolation groove.

3. The method according to claim 2, further comprising, after the step of forming the embedded layer, the step of forming a third insulating film on the embedded layer.

4. The method according to claim 1, further comprising, between the step of forming the element isolation groove and the step of depositing the second insulating film, the step of forming an oxide film by oxidizing the semiconductor layer at a wall surface of the element isolation groove, wherein

the step of depositing the second insulating film includes the step of depositing the second insulating film so as to cover the oxide film.

5. The method according to claim 4, wherein the oxide film has a thickness of 50 nm or less.